Claims

[c1] We claim:

1.A method for determining a distance of an object disposed in an environment, comprising:

transmitting a light pulse to a polymeric light reflector at a first time;

reflecting said light pulse from said reflector;

receiving a portion of said light pulse reflected from said object, said portion being received at a second time; and,

determining a distance of said object based on a time difference between substantially said first and second times.

[c2] 2.The method of claim 1 wherein said reflecting step includes:

reflecting said light pulse from a first reflective surface in said reflector to a second reflective surface in said reflector; and,

reflecting said light pulse outwardly from said second reflective surface.

[c3] 3.The method of claim 1 wherein said determining step includes:

generating a received waveform based on said received light pulse;

indicating the object is detected when any portion of said waveform has an amplitude greater than a predetermined threshold at said second time; and,

calculating said distance based on said time difference between substantially said first and second times.

[c4] 4.The method of claim 3 wherein said predetermined threshold has a first value at a first elapsed time after said transmission and a second value at a second elapsed time, said second elapsed time being after said first elapsed time, said second value being less than said first value.

[c5] 5.The method of claim 1 wherein said determining step includes:

generating a received waveform based on said received light pulse;

multiplying an amplitude of said received waveform by a gain value to obtain a gain adjusted value; and,

indicating said object is detected when said gain adjusted value is greater than a predetermined threshold at said second time; and,

calculating said distance based on said time difference between substantially

said first and second times.

[c6] 6.The method of claim 1 wherein said light pulse comprises a near-infrared light pulse.

[c7] 7.A method for determining a distance of an object, comprising:
transmitting a plurality of light pulses to a polymeric light reflector;
reflecting said light pulses from said reflector;
receiving said light pulses reflected off said object using a light detector;
determining an average travel time of said plurality of pulses; and,
determining a distance of said object based on said average travel time.

[c8] 8.The method of claim 7 wherein said step of determining an average travel time includes:
generating a plurality of received waveforms responsive to said light pulses received by said light detector;
aligning said plurality of received waveforms in a common time interval;
determining an averaged received waveform by averaging said
said plurality of received waveforms over said common time interval; and,
calculating said average travel time of said light pulses based on said averaged received waveform.

[c9] 9.The method of claim 7 wherein said plurality of light pulses comprise a plurality of near-infrared light pulses.

[c10] 10.A system for determining a distance of an object, comprising:
a light source generating a light pulse at a first time;
a polymeric light reflector receiving said light pulse and reflecting said light pulse;
a light detector configured to receive at least a portion of said light pulse reflected off the object, said portion being received at a second time; and,
a controller operably connected to said light source and said light detector, said controller configured to
determine a distance of the object based on a time difference between substantially said first and second times.

[c11] 11.The system of claim 10 wherein said light source comprises a near-infrared light source.

[c12] 12.The system of claim 10 wherein said polymeric light reflector includes a first and second plurality of reflective facets, said first plurality of reflective facets receiving said light pulse from said light source and reflecting said light pulse to a second plurality of reflective facets that further reflect said light pulse toward the object.

[c13] 13.The system of claim 10 wherein said polymeric light reflector includes a transparent portion and a reflective surface, said light pulse moving through said transparent portion to said reflective surface, said surface reflecting said light pulse toward the object.

[c14] 14.The system of claim 10 wherein said light detector comprises a near-infrared light detector.

[c15] 15.The system of claim 10 wherein said controller is further configured to generate a received waveform based on said received light pulse, said controller being further configured to indicate the object is detected when any portion of said waveform has an amplitude greater than a predetermined threshold at said second time.

[c16] 16.The system of claim 15 wherein said predetermined threshold has a first value at a first elapsed time after said transmission and a second value at a second elapsed time, said second elapsed time being after said first elapsed time, said second value being less than said first value.

[c17] 17.The system of claim 10 wherein said controller is further configured to generate a received waveform based on said received light pulse, said controller being further configured to multiply an amplitude of said received waveform by a gain value to obtain a gain adjusted value, said controller being further configured to indicate the object is detected when said gain adjusted value is greater than a predetermined threshold at said second time.

[c18] 18.An article of manufacture, comprising:

a computer storage medium having a computer program encoded therein for determining a distance of an object, said computer storage medium comprising:

code for inducing a light source to emit a light pulse at a first time that is reflected by a polymeric light reflector toward an object;

code for storing values indicative of a received portion of said light pulse reflected from the object at a second time; and,

code for calculating a distance of the object from said reflector based on a time difference between substantially said first and second times.